

Domesticating Human Capital: The Material Culture of Knowledge in Early Modern Amsterdam

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Abstract

This article investigates the consumption of knowledge in early modern Amsterdam. A dataset of seventeenth- and eighteenth-century probate inventories is employed to examine the synergies and inequalities between the skilled and educated middle classes and the intellectual elites. A series of democratisation waves in the ownership of books, writing equipment, and measuring tools confirms the unprecedented levels of basic literacy and numeracy skills in the urban centres of the early modern Low Countries revealed by research on signature proficiency and age heaping. The

concentration of secular books and advanced knowledge objects in the hands of a small but growing group of affluent households, on the other hand, corresponds to other research that has fixated instead on the role of upper-tail human capital in scientific, technological, and economic progress. Yet, the relatively low value estimates of libraries and scientific instruments, together with a more qualitative examination of two amateur scientists of middling background, dovetails with the hypothesis that the Dutch Scientific Revolution and Enlightenment were marked by a close interaction and mobility between craftsmen and scientists. An above-average income and enough leisure time to develop intellectual interests could be sufficient for inhabitants of Amsterdam to cross the Rubicon from consuming to (re)producing knowledge.

Keywords: material culture, human capital, intellectual history, craftsmanship, Scientific Revolution, Enlightenment

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In May 1780, the Amsterdam-based Catholic candlemaker Jan Bloemsaat died in his home on the Zeedijk at age forty-eight from a fever. He not only left behind his wife and four children from a previous marriage, but also a sizeable inheritance worth more than 15,000 guilders. His probate inventory, drawn up three months after his death by the notary Engelbertus Marinus Dorper, describes, in addition to the movable goods stored in the Zeedijk residence, Bloemsaat's holdings in real estate, shares in merchant ships, and tools and products pertaining to his 'candle, smelt, and fat store'. Conspicuous among his possessions were all sorts of objects denoting erudition. Bloemsaat's collection of 169 books, which ranged from religious works and dictionaries to dozens of treatises on history, geography, and the natural sciences, demonstrates that he was an avid consumer of new knowledge produced during the Age of Enlightenment. Moreover, other objects such as an electrostatic generator, 'some equipment belonging to a microscope', as well as manuals for using these two devices, offer tantalising hints at active engagement in the (re)production of scientific knowledge. The description of a 'broken' magic lantern and 'broken' binoculars adds to this conclusion, but it also signals a potentially amateurish application of scientific instruments. As far as we can tell, after all, Bloemsaat did not leave behind any publications or manuscripts.¹

What is perhaps most fascinating about this piece of information is the methodological setting in which it was discovered. Jan Bloemsaat is not a known name in the pantheon of Dutch scientists, and the inclusion of his estate in our dataset of post-mortem inventories from Amsterdam's notary archives was not preconceived. This finding is more than just a lucky coincidence, as scholars have amply demonstrated the high

¹ Amsterdam, Stadsarchief (hereafter SA), Notarissen ter standplaats Amsterdam (hereafter Notarissen) 15729, Probate inventory of Jan Bloemsaat, 10 August 1780, fols. 46-63. Bloemsaat's age and cause of death were noted in the tax burial records: SA, Stadssecretaris 162, Marriage and burial tax records, 26 May 1780. The Digitale Bibliotheek voor de Nederlandse Letteren, which records all known historical texts in the Dutch language, shows no results for Jan Bloemsaat. The impetus for this article was Lotte Kemps's bachelor thesis, written at the University of Antwerp under the supervision of Bas Spliet and Bruno Blondé. Data gathering and additional research were funded by the Research Foundation – Flanders (FWO) senior research project 'The embarrassment of riches? Inequality and the Dutch material culture. Amsterdam, 1581-1780', on which Bas Spliet is currently working as a PhD candidate.

levels of human capital in the early modern Low Countries. The occupation of this amateur scientist particularly corresponds to the proposition that artisans played an important role in the Dutch iteration of the Scientific Revolution. In fact, the case of our unknown candlemaker is eerily reminiscent of the life of Isaac Beekman, a natural philosopher active in the early seventeenth-century Dutch Republic. Like Bloemsaat, Beekman had started off as a candlemaker, a trade he had learnt from his father, and he also made a living by constructing and repairing water systems in breweries, before pursuing university studies and becoming headmaster of the Latin school in Dordrecht. Beekman never published his contributions to natural philosophy, mathematics, technology, and meteorology and was thus not known in his own time as a professional scientist. Beekman's diary, however, was published posthumously. Since its rediscovery in the twentieth century, Beekman has been regarded as one of the most influential Dutch scientists of his era.²

In Beekman's diary we find practical questions dealing with hydraulics and candle manufacturing juxtaposed with abstract discussions of natural philosophy. Bloemsaat's inventory likewise contains evidence of scientific activity going hand in hand with candle making, which dovetails with Klaas van Berkel's suggestion that Beekman's trajectory was part of a broader 'union of hand and mind' between artisans and scientists typical of the Dutch path to modern science.³ While quantitative studies on human capital formation are too abstract to illuminate its inner workings, well-known 'go-between' like Beekman provide us with a picture through qualitative, albeit anecdotal, evidence of this historical interaction. Our database of 402 probate inventories is ideally situated between these two poles. The sources are sufficiently detailed to get a meaningful grasp of the material culture of knowledge in seventeenth- and eighteenth-century Amsterdam, but they are also numerous enough to be utilised in statistical examination. By 'domesticating' human capital, we gain insight into the production and consumption of knowledge in this pre-modern Dutch metropole.⁴

From Production to Consumption

Naturally, most scholars of intellectual history have focused their gaze on the production of knowledge.⁵ Dutch cities formed a staging ground for the Enlightenment by virtue of their reputation as safe havens for intellectuals from all over Europe, and also because of their central location in global trade networks.⁶ As *primus inter pares*, Amsterdam served as

² Van Berkel, 'The Dutch Republic', 88-92.

³ Van Berkel, 'The Dutch Republic'.

⁴ Compare: Hannan, *A Culture of Curiosity*.

⁵ On intellectual developments and the Dutch Enlightenment, see: Dijksterhuis, *Lenses and Waves*; Dijksterhuis, Weber, and Zuidervaart (eds.), *Locations of Knowledge*; Henry, 'Fragmentation'; Kuijpers and Verhoeven (eds.), *Makelaars in kennis*; Maas, 'Civil Scientists'; Schuurman, *Ideas, Mental Faculties*; Snelders, 'Professors, Amateurs, and Learned Societies'; Struik, *The Land of Stevin and Huygens*; Vermij, 'Defining the Supernatural'; Vermij, *The Calvinist Copernicans*.

⁶ Mijnhardt, 'Urbanization'.

the commercial ‘centre of the world’ as well as ‘the central city of the Republic of Letters’.⁷ While the members of this literary network constituted only a small fraction of society, their intellectual and scientific endeavours depended in one way or another on the rest of the population, if only because the latter’s productivity in agriculture and industry enabled the former sufficient leisure time to read, write, and experiment. But Enlightenment thinkers went further than that, arguing that craftsmen and entrepreneurs contributed to knowledge production in essential ways. Adam Smith for instance believed that ‘common workmen’ were the original linchpin of technological innovation, although ‘men of speculation, whose trade is not to do anything, but to observe everything’, were helpful in ‘combining the powers of the most distant and dissimilar objects’.⁸ Denis Diderot and his co-authors, too, maintained in the *Encyclopédie* that every ‘art’ (i.e., technique) had both a practical and theoretical side, which they saw as indispensable to one another for technical progress to take place.⁹

Modern historians have advanced similar arguments for early modern Europe. Driven by empirical work but inspired by humanism, artisans published pamphlets and books about their practical experience in the workplace, influencing scholars who made artisanal knowledge part of the European scientific culture.¹⁰ Until the twentieth century, the proto-scientific and trial-and-error methods of artisans were often accorded a lower status than the methods of natural philosophers, and as a result neglected in intellectual history.¹¹ In the last few decades, however, historians of science have pointed out that the middle classes – especially the craftsmen and artisans on the shop floor – contributed as much to early modern intellectual developments as the learned elites. As a result of this, science as practiced in the Dutch Republic has reclaimed its rightful place in intellectual history, allowing the words and actions of craftsmen, engineers, mathematicians, and physicians to be considered as relevant as those of the renowned scientists and natural philosophers of other nations for understanding the changing interpretations of nature in the early modern period.¹²

Growing academic interest in practical knowledge notwithstanding, we still know remarkably little about the conditions that gave rise to its successful synergy with the theoretical knowledge accumulated by Smith’s ‘men of speculation’. Economic historians have attempted to model the historical interaction between theoretical and practical knowledge. Joel Mokyr contends that in Western Europe, these two types of knowing began to merge successfully towards the end of the early modern era, forging an intellectual marriage that he argues to be the true cause of the Industrial Revolution. Questions about the *what* and the *why*, which were increasingly answered thanks to the Scientific Revolution and Enlightenment, enabled the *how* questions that entrepreneurs had always asked themselves to be

7 Frijhoff and Prak, *Geschiedenis*; Eisenstein, *The Printing Press*, 409. See also Bots, *De republiek der letteren*; Thijssen-Schoute, *Uit de Republiek der Letteren*; Van Miert, ‘What was the Republic of Letters?’.

8 Smith, *The Wealth of Nations*, Bk. I, 115.

9 Diderot, Mallet, and Yvon, ‘Art’, 713.

10 Buning, ‘Inventing the scientific method’, 64; Smith, *The Body of the Artisan*, 8; Corteguera, ‘Artisans and the New Science’, 601.

11 Grossmann, ‘Descartes and the Social Origins’, 214.

12 Van Berkel, ‘The Dutch Republic’, 85.

solved more intelligibly. Positive feedback loops between theoretical and practical knowledge, he maintains, lay at the basis of the Schumpeterian growth that defines the modern economy.¹³ While Mokyr looked primarily at eighteenth- and nineteenth-century Britain, Pamela H. Smith has claimed that the early origins of the synergy between theoretical and practical knowledge originated with the artisans of Renaissance humanism.¹⁴ Besides, for much of the early modern era the Low Countries had assumed the technological leadership of Europe, so perhaps we need to change our view of France and Britain as the frontrunners for intellectual and industrial development.¹⁵ We can thus expect scientific and practical knowledge to have converged early on in the Low Countries, which have a long history of combining strong industrious middling groups and high levels of education. The tremendous efforts led by Jan Luiten van Zanden to quantify these two distinct types of human capital have further broadened our understanding of the deeper origins of the ‘little’ and ‘great’ divergences that distinguished the early modern (knowledge) economies of Britain and the Low Countries.¹⁶

In many ways, however, the proxies employed in economic history for human capital formation, such as data on literacy, numeracy, skill premia, and book production, raise more questions than they answer. Does the ability to sign a document indicate a propensity to write and read habitually? Does increased accuracy of reporting one’s age signal the competence to read time, measure weight, calculate, and do accounting? And do aggregate statistics on book production not disguise inequalities in book possession? We argue that while these abstract measures of human capital are useful, they must ultimately be re-embedded into the societies from which they were quantitatively extracted. With that goal in mind, this article turns to the consumption side of the economic equation for answers, because we believe that domesticating human capital in the private material culture of Dutch households can shine a new light on how deeply the knowledge economy reached into people’s daily lives.

13 Mokyr, *The Gifts*; Moykr, *A Culture*.

14 Smith, *The Body of the Artisan*, 3–30.

15 See especially Cunningham and Williams, ‘De-centring the “Big Picture”’, which questions the traditional grand narrative of the origins of modern science and intellectual culture, which they view as a product of the Age of Revolutions. The authors propose a new big picture in which science is seen as a distinctly modern, Western phenomenon rather than a human universal one, which is to be treated as one of many forms of human knowledge-seeking activities. See also Orthia, ‘What’s Wrong’, which attempts to bridge the gap between the history of science and science educators, communicators, policymakers, and scientists in general by reviewing scholarly papers published between 1994 and 2014 that cited Cunningham and Williams or otherwise discussed the Scientific Revolution. Other studies on the origins of modern industrial, technological, or intellectual developments are: Buning, ‘Inventing scientific method’; Conceição Ruivo, ‘Instruments and Scientific Culture’; Davids, *The Rise and Decline of Dutch Technological Leadership*; Dear, ‘Cultural History of Science’; Eamon, ‘La Revolución Científica’; Findlen, ‘Between Carnival and Lent’; Freudenthal and McLaughlin (eds.), *The Social and Economic Roots of the Scientific Revolution*; Hooykaas, ‘Rise of Modern Science’; Jacob and Mijnhartd (eds.), *The Dutch Republic*; Jorink and Maas (eds.), *Newton and the Netherlands*; Lux and Cook, ‘Closed Circles or Open Networks?’; Kuijpers and Verhoeven (eds.), *Makelaars in kennis*; Mijnhardt, ‘Urbanization’; Rossi, *Philosophy, Technology, and the Arts*; Shapin, *The Scientific Revolution*; Van Berkel, ‘The Dutch Republic’; De Grijis, ‘The search for longitude’.

16 Van Zanden, ‘De timmerman’; Buringh and Van Zanden, ‘Charting’; Baten and Van Zanden, ‘Book Production’; Van Zanden, ‘The skill premium’; De Moor and Van Zanden, “‘Every woman counts’”.

It would not be the first time that a closer look at demand has helped solve economic puzzles deadlocked by an excessive focus on supply. In economic theory, the insight that prices are determined as much by the subjective values of consumers as by the factors of production overhauled classical orthodoxies and revolutionized economics in the 1870s.¹⁷ A century later, evidence of an expanding array of consumer goods in Northwestern Europe prior to the Industrial Revolution put into question the idea that living standards were stagnant or declining throughout the early modern period.¹⁸ This observation led Jan de Vries to formulate his theory of the industrious revolution, which posits that growing consumer demand in Northwestern Europe after 1650 stimulated households to become more productive in order to satiate their desire for ‘new luxuries’, such as paintings, porcelain, Delftware, cotton clothing, tea, coffee, and sugar.¹⁹ Much of these insights are built on research into probate inventories, which enumerate the movable goods and other possessions of a household at the time of death of one of its members.²⁰ Studies of probate inventories from various Dutch cities and towns have concluded that Dutch material culture was surprisingly uniform.²¹ Was the ‘union of hand and mind’ that enabled the production of knowledge in Amsterdam mediated by a similar uniformity in the consumption of knowledge objects, such as books and writing desks, timepieces and balances, globes and maps, or barometers and thermometers? Or were (some of) these objects owned exclusively by the upper classes? If so, were the barriers that separated households owning many knowledge objects from those with a more modest array purely a result of economic constraints, or were they also informed by more complex social factors?

Our dataset contains all surviving probate inventories with value assessments from Amsterdam’s notary archives drawn up during four sample periods: 1630-1635, 1680, 1730, and 1780.²² Our stratification methodology is sociological in the sense that it starts from the premise that artisans and shopkeepers formed the ‘inclusive’ and stable core of the urban middle classes in the early modern Low Countries, Amsterdam included.²³ Indeed, in each sample roughly a third to half of inventories could be identified as belonging to a craftsman or retailer. Historians of material culture have emphasised the role of these professional urban middle classes in the consumer revolution of the seventeenth and eighteenth centuries.²⁴ As noted above, intellectual historians have also argued that these groups functioned as a catalyst for the development of intellectual culture. If artisans and shopkeepers were a driving force behind the production and dissemination of knowledge by virtue of their professional capacities, it would be wise to take a closer look

17 Wasserman, *The Marginal Revolutionaries*, 17-54.

18 De Vries, ‘Between Purchasing Power’. For recent overviews on the debates on the consumer revolution and real wages, see, respectively, Kwass, *The Consumer Revolution*; Hatcher and Stephenson, *Seven Centuries*.

19 De Vries, *The Industrious Revolution*.

20 Wijsenbeek-Olthuis, *Boedelinventarissen*.

21 De Vries, ‘Peasant demand’; Van Koolbergen, ‘De materiële cultuur’; Wijsenbeek-Olthuis, *Achter de gevels van Delft*; McCants, ‘Poor Consumers’.

22 SA, Notarissen.

23 Blondé, Boone, and Van Bruaene (eds.), *City and Society*; Prak and Van Zanden, *Pioneers*. On Amsterdam specifically, see: Lesger, ‘De wereld’; Lesger, ‘Vertraagde groei’; Lesger, ‘Stagnatie’.

24 Kwass, *The Consumer Revolution*, 26-29.

Tab. 1 Distribution around the median of total movables value of inventories belonging to artisan and shopkeeper households (top) and the resulting stratification of the dataset into three classes (bottom).

	1630	1680	1730	1780
Movables value of artisans and shopkeepers (fl.)				
N (%)	41 (42.7%)	48 (47.5%)	41 (40.2%)	33 (32.0%)
Quartile 1	370.25	297.06	339.30	362.54
Median	632.10	621.64	792.70	750.15
Quartile 3	1041.00	1109.61	1675.85	1308.59
Classification of inventories (N)				
A	28	25	35	33
B	38	47	48	43
C	30	29	19	27
Total	96	101	102	103

at their private interactions within the culture of knowledge. Indeed, material engagement with knowledge was not restricted to the workplace, as 139 of the inventories of artisans and shopkeepers (87.4 percent) owned objects requiring some kind of knowledgeable application, such as books, writing material, maps, clocks, rare curiosities, and scientific instruments.

The first and third quartiles of the aggregate value of all movable goods in the four samples' control group of identified artisans and shopkeepers served as the lower and upper boundary of the middle group 'B', while inventories falling above or below these two perimeters were classified as class 'A' and 'C', respectively (tab. 1).²⁵ Linkage of the rental values of about a third of the deceased's homes to a real estate tax source, which provides a nearly complete picture of Amsterdam's housing distribution at the end of the city's expansion in the early 1730s, permits us to roughly estimate that the three classes each represent around twenty percent of Amsterdam's household population.²⁶ At least a third, and perhaps as much as half of the urban hierarchy – the city's poor inhabitants – thus escape our view. The three groups are therefore characteristic of a broad segment of mercantile elites (A) and the established burgher households forming the upper (B) and lower (C) segments of the urban middle classes.

Although we have to remain mindful of the fact that the urban poor and some ephemeral, cheap, or hidden commodities escape our view, the inventoried households provide a unique window into the material world of goods that animated Amsterdam's vibrant intellectual culture. Over the course of one hundred and fifty years, consumer goods indicative of domestic consumption of human capital became ubiquitous in Amsterdam households: they were registered in 77.1 percent (1630), 80.2 percent (1680), 88.2 percent (1730), and

²⁵ Similar methods have previously been used in De Laet, *Brussel binnenskamers*; Baatsen, *A Bittersweet Symphony*; Saelens, *The Comforts of Energy*?

²⁶ We are grateful to Matthijs Korevaar for sharing his dataset of this source. As it contained only rental values at house level, we adjusted it as follows: the rental values of houses that were (partly) rented out were replaced with the rental values of the different home units. The rental values of all housing units can be found in SA, Honderdste en Tweehonderdste Penningkamer of Commissarissen tot de Ontvangst van de Honderdste en Andere Penningen 203-268, Redres van de verpondingen, 1732. To fill up the gaps in this source, we turned to the original records kept in The Hague, National Archives, Financie van Holland 498-501, Kohieren Amsterdam, 1732. See also: Eicholtz, Straetmans, and Theebe, 'The Amsterdam Rent'.

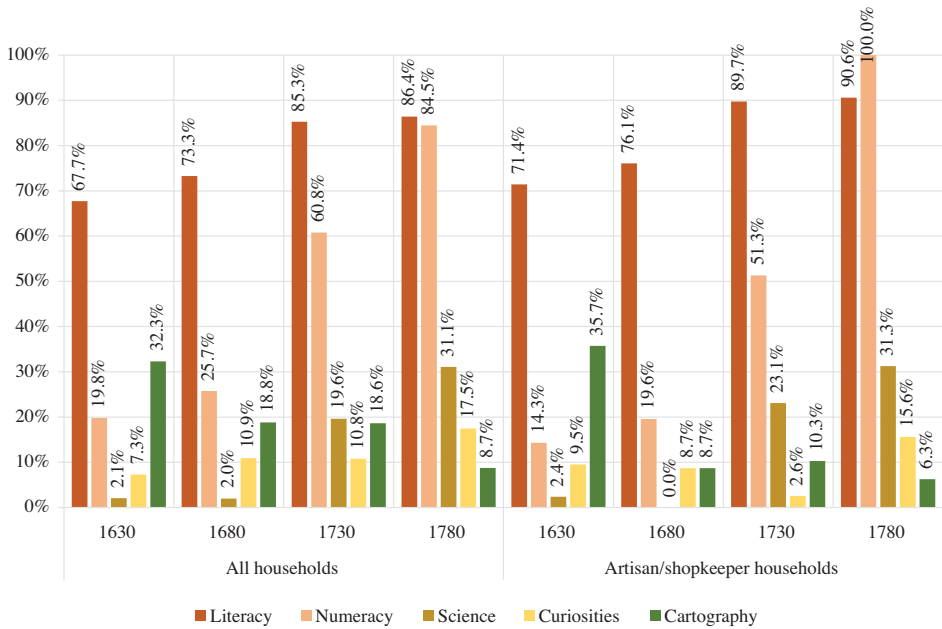


Fig. 1 Percentage of all inventoried Amsterdam households (left) and artisan and shopkeeper inventories (right) owning at least one knowledge object, by category.

99.0 percent (1780) of inventories.²⁷ For the purpose of this inquiry these ‘knowledge objects’ have been grouped together in five larger categories: literacy (books and writing material), numeracy (timepieces, weights, and balances), science (observational, experimental, and meteorological measuring instruments), curiosities, and cartographic objects.

A bird’s-eye view of the percentage distribution of these five categories confirms that the ownership of items representative of the material culture of knowledge of artisans and shopkeepers on the whole overlaps with the general trend of all household inventories. With the exception of cartography, this trend is one of diverse degrees of expansion and thus follows the broader trend of rising consumption (fig. 1). We begin our analysis with literacy, the type of human capital that has most interested economic and cultural historians. The second section of this article shows that Amsterdam was unique in the widespread consumption of books amongst its inhabitants, but also demonstrates that the possession of large book collections and writing material was rarer. The third section analyses numeracy, the practical skills of arithmetic which were just as, if not more important to middling households. Here we seem to record the steepest rises, which raises the question why objects related to basic numeracy skills increased in the eighteenth century, when entrepreneurial activity receded. The answer lies in the emergence of clocks and watches, which are probably more indicative of conspicuous consumption than human

²⁷ Compare: Li et al., ‘Learning by consuming’.

capital formation. The last section further problematises the tension between knowledge and consumption, and examines the categories of knowledge objects which were concentrated in a smaller percentage of homes.

Reading and Writing

In recent years a number of historians have changed their focus from paintings to books as the focal point of the Dutch Golden Age. The fame that the Dutch masters enjoy in contemporary times has not only captivated generations of cultural historians, the widespread decoration of middle-class households with pictures of varying quality in the seventeenth-century Republic (and sixteenth-century Brabant) has also attracted much attention from consumption historians. The estimated three million paintings decorating the walls of dwellings in Holland by the 1660s are indeed powerful evidence of the pioneering role of the Dutch in the consumer revolution.²⁸ Yet, Andrew Pettegree and Arthur der Weduwen have estimated that copies of printed books in the seventeenth-century Republic outnumbered paintings by a factor of hundred to one. Unlike paintings, moreover, books became one of the leading export products during the Golden Age. Nevertheless, Pettegree and Der Weduwen contend that the heart of the book industry was the domestic market. The Dutch not only published more books per capita than any other book-producing nation in Europe, they also purchased by far the largest quantity of them.²⁹

Economic historians, for their part, see the booming printing industry as evidence of the advanced human capital accumulated in the early modern Low Countries. By the fifteenth century, the Southern and Northern Netherlands were already producing several times more manuscripts per head than other European regions, and after the invention of the printing press, Antwerp and Amsterdam became important publishing centres. Between 1600 and 1800, the period of our study, 'the Dutch had no rivals' in terms of output per capita according to Eltjo Buringh and Jan Luiten van Zanden. These two historians have transformed their data on per capita book production into data on per capita book consumption by correcting for the import and export of books, an exercise that confirmed the gap between the Republic and the rest of Europe. In the second half of the eighteenth century, when the Dutch economy started lagging behind a rapidly industrializing Britain, the Dutch still produced almost one book for every two inhabitants annually, as opposed to one book per eight Britons across the Channel.³⁰

The pivot towards books in Dutch economic and cultural history, for all its impressive advances in quantifying information about production, has paid very little attention to inequalities of consumption. The data produced by Buringh and Van Zanden on per capita book consumption provides an average for the country as a whole but gives no insight into variations between regions or social classes. Pettegree and Der Weduwen point to a few anecdotal examples from auction records of large book collections of commoners, such as

²⁸ Van der Woude, 'The Volume', 314 (table 8).

²⁹ Pettegree and Der Weduwen, *The bookshop*, 16.

³⁰ Buringh and Van Zanden, 'Charting'. See also Baten and Van Zanden, 'Book Production'.

a brewer from Amsterdam who owned more than one thousand titles, but it is unclear how representative these cases really were for the city's middling groups. They also highlight the twenty-two books noted in Rembrandt van Rijn's 1656 bankruptcy inventory, which they see as being on the low side and a sign of the painter's hardship at this point in his career.³¹ Among the sixty artists that left behind an inventory in the second half of the seventeenth century, however, Rembrandt's meagre collection does not appear all too exceptional. The post-mortem inventory of the sculpturer Albert Vinckenbrinck, composed not in the context of insolvency but at the end of a successful career, contained twice as many books as Rembrandt's, but twenty-seven percent of the artist inventories showed no books at all.³²

Much like the first generation of material culture historians, recent scholarship on the Republic's leading role in the publishing industry operates on the assumption that large increases in production, by virtue of sheer size, must have gone hand in hand with revolutionary changes in consumption that affected large segments of the population. José de Kruif's study on eighteenth-century The Hague did manage to provide considerable detail about the social distribution of book consumption, however. Remarkably, she found no evidence for a middle-class 'reading revolution', which earlier historians claimed had taken place after 1750 in Germany and England. Although per capita book consumption must have been at least as high in The Hague, no substantial expansion in book possession among the middle classes was discernible. The number of books mentioned in probate inventories did grow, especially in the first part of the eighteenth century, but this growth was mostly concentrated in the lower and upper classes. Among poorer urban dwellers many crossed the threshold from owning no books at all to possessing a Bible, psalm book, or other religious literature, while most of the remaining growth – especially in the secular genres – happened within the expanding libraries of elite households.³³

Can these findings be replicated in our dataset of Amsterdam probate inventories, which extends back well into the seventeenth century and concentrates on Holland's leading commercial and publishing city? Fig. 2 shows the percentage of sampled households that owned at least one book. While it took until 1780 for a small majority in the lower middle class (class C, 55.6 percent) to become book owners, most inventories from the upper class already contained books in 1630 (class A, 82.1 percent). Over the eighteenth century, book ownership within the upper middle class (class B) remained stable, as in The Hague, but our data for the seventeenth century reveals a substantial increase from half to over three quarters of upper middle-class households owning at least one book. De Kruif's observation that books came in reach of more and more lower-class households in eighteenth-century Holland is thus confirmed, but the data from Amsterdam shows that book ownership among the affluent, middling layers of urban society went through a similar, more pronounced democratisation process a century earlier.

Taken together, these findings reveal a gradual process of downward social expansion of book ownership that materialised over several centuries and went hand in hand with the increased supply of books. The latter development started in earnest in the second half

31 Pettegree and Der Weduwen, *The bookshop*, 1-3.

32 Kattenberg and Baars, "Het leezen".

33 De Kruif, 'Classes'.

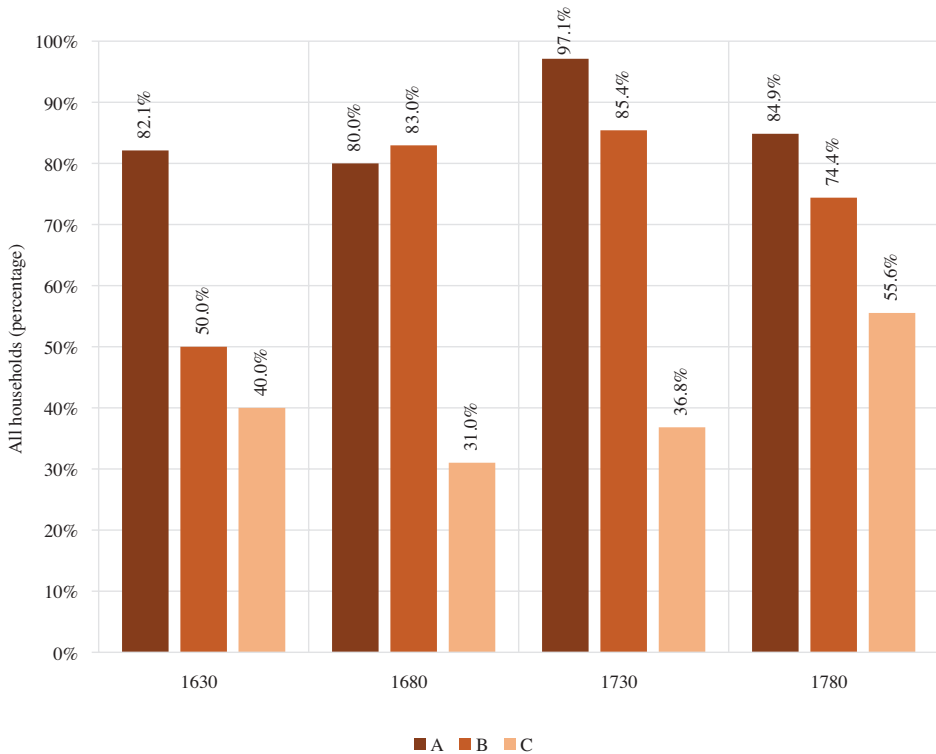


Fig. 2 Percentage of households owning at least one book, by class.

of the sixteenth century, when per capita book consumption in the Northern Netherlands experienced its largest growth rate in the early modern era. Thus, the two democratisation waves shown in fig. 2 were most likely preceded by another one that expanded book ownership from a small elite to a broader group of affluent households. The Southern Low Countries probably experienced only the first of these two democratisation waves, as the frequency of books in sixteenth-century Amiens and seventeenth-century Douai never exceeded twenty percent.³⁴ Indeed, per capita book consumption in the Southern Netherlands stagnated after 1600, while it continued to grow north of the Scheldt River. By the eighteenth century, the Dutch on average owned ten times more books than their Catholic neighbours.³⁵

These trends in book ownership reflect literacy rates, which have been well studied for Amsterdam, based on the ability of partners to sign their pre-marriage contracts.³⁶ Even before the late sixteenth-century economic boom induced by a huge influx of immigrants,

³⁴ Muchembled, *De uitvinding*, 323.

³⁵ Buringh and Van Zanden, 'Charting', 421.

³⁶ Hart, *Geschrift en getal*; Kuijpers, 'Lezen'; Van Weeren and De Moor, *Ja*, 189-199. We use the latter's data, which is the most recent and extensive.

more than half of grooms and around a third of brides were able to sign their names. After 1630 literacy gradually expanded, proportionate to book ownership. In the eighteenth century, when in the Southern Netherlands still only about half of males were literate, more than seventy percent of households in Amsterdam were headed by a literate male, a figure that appears to track book consumption rates closely. As soon as one of the partners was literate at the age of marriage, it seems, Amsterdam households began to purchase books. This is a first indication that supply and demand interacted smoothly in the production and consumption of human capital.

But how many books did Amsterdam households own, and did the number of books at death differ across social classes? This question is more difficult to answer, because exact quantities are not always reported. The frequency with which notaries mentioned ‘some’ books increased over time (from seven percent in 1630 to eighteen percent in 1780), and as a rule occurred somewhat more often in classes B and C than in class A. To mitigate this bias, we have interpreted ‘some’ books to mean five books, rather than two as is common in inventory research. With this qualification the median number of books quintupled, from one throughout the seventeenth century to five in 1780. In other words, the increase in book ownership frequency between 1630 and 1680 for the upper middle-class in Amsterdam was consolidated by a subsequent increase in the number of books that middling households owned. A handful of inventories from class B in the three last samples even listed twenty or more books, although most large collections remained concentrated in class A. Unlike in The Hague, the political centre of the Republic, the middling layers of its commercial metropole clearly increased their stock of books further in the eighteenth century.

That said, the books owned by middling and poorer households remained overwhelmingly religious in character. Of the 421 books in the dataset that could be identified as having secular content, 390 (92.6 percent) belonged to the upper class. The allocation of the 600 identified religious books, on the other hand, was much less biased, with class A owning 323 books (53.8 percent). The resulting odds ratio is 10.8, meaning secular books were more than ten times more likely to be possessed by the urban elites than religious books. In that sense, the situation was similar to The Hague and other parts of Protestant Europe with relatively high rates of literacy and book consumption.³⁷ The fact that large libraries containing books on history, geography, philosophy, and the natural sciences – the genres that most interested aspiring intellectuals like Bloemsaat – remained limited to a small segment of the population, in economically advanced and stagnant parts of Europe alike, has led some scholars to cast doubt on the use of book ownership as a relevant measure of overall human capital. The few books that ordinary households possessed in premodern Europe often had little to do with enhancing one’s skills and productivity.³⁸ Literary knowledge thus remained the privilege of a small elite. At the same time, eighteenth-century Amsterdam does appear to stand out in the sense that a quite large group of more affluent households managed to accumulate a sizeable collection of books.

37 De Kruijf, ‘Classes’, 438-442; Ogilvie, Edwards, and K pker, ‘Economically relevant human capital’.

38 Ogilvie, Edwards, and K pker, ‘Economically relevant human capital’.

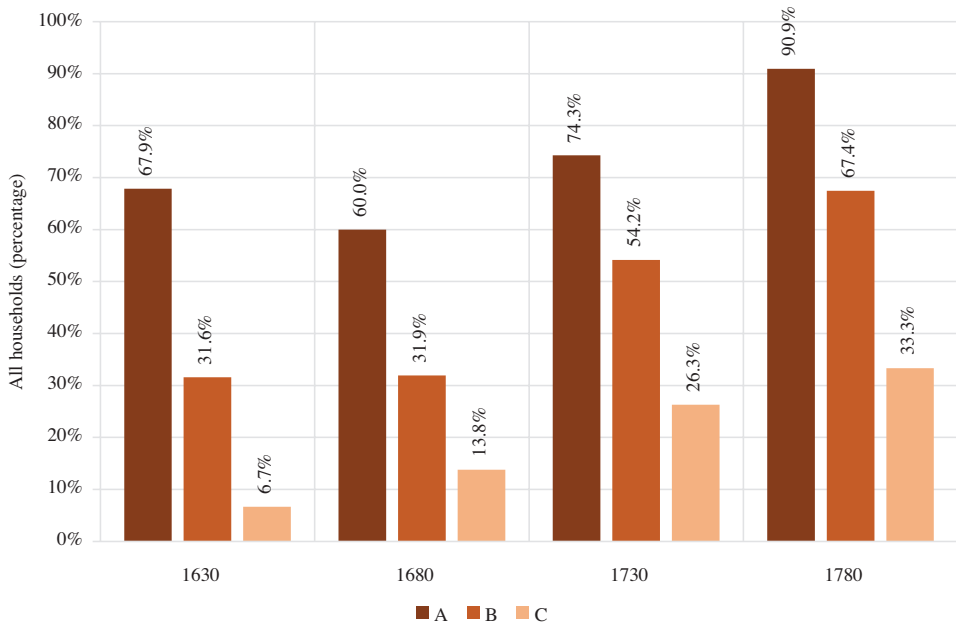


Fig. 3 Percentage of households owning at least one object relating to writing, by class.

This twofold observation is reflected in the material culture of writing, too. Contrary to book consumption and signature rates, writing equipment indicates active employment of literacy skills at home. Information on writing is more elusive in the inventories, however, because they did not record quills and paper as thoroughly as they did books. Yet, in spite of potential underestimation, the number of (writing) desks, letter cabinets, inkpots, and other objects related to writing increased greatly among all classes between 1630 and 1780 (fig. 3). By the time the Patriot Revolution broke out, habitual writing seems to have taken place in almost all of the wealthiest households, two thirds of the upper middle class, and a third of the lower middle class. This constitutes strong evidence that habitual writing was firmly entrenched in Amsterdam by the end of the eighteenth century. Among the broader pool of relatively affluent consumers, those interested in partaking in scientific and intellectual conversations during the Age of Enlightenment, as was Bloemsaat, had the capability to do so.

At the same time, fig. 3 also shows that the social gap between the three classes remained in place, even if it narrowed towards the end of the period under study. Moreover, in the second half of the eighteenth century, as the masses were occasionally caught up in the battle between Orangists and Patriots through pamphlets or other forms of public politics, secular books and writing material were probably largely absent in the homes of the poor households that escape our view. Domestic reading and writing of the sort that fostered scientific learning or understanding Enlightenment ideas, in short, remained the prerogative of a limited but growing group of educated citizens.

Counting and Measuring

We have already seen that literacy rates closely tracked levels of book consumption, and that both were high in seventeenth- and eighteenth-century Amsterdam by premodern standards. In many ways counting and calculating was an even more important skill for the vast majority of the urban population, since it was essential for all forms of market traffic. Research into age heaping (i.e., rounding off ages) has shown that, just like literacy, numeracy experienced rapid growth early on in the Low Countries. While elsewhere in Western Europe thirty-five to forty-five percent of the population gave an incorrect age in population censuses around 1500, only fifteen to twenty percent did so in West Flanders, Zeeland, and Holland. Age heaping rates even dropped to five percent or less in the sixteenth century, confirming the historically unprecedented levels of quantitative reasoning among inhabitants of the early modern Low Countries.³⁹ While there was a clear divergence in literacy skills between north and south during and after the Dutch Golden Age, rounding off ages remained equally rare in Amsterdam and Antwerp in the eighteenth century.⁴⁰

A closer look at timepieces demonstrates how this quantitative form of human capital was embedded differently in the material culture of the two metropolises. Bruno Blondé and Gerrit Verhoeven have shown that in early modern Antwerp an advanced interest in accurately assessing, computing, and registering measurements – including atmospheric pressure, temperature, and time – was restricted to a small group of single, upper-class men. The ownership of timepieces, in particular, seems to have been intrinsically linked to social rank, in spite of the fact that clock towers in the public sphere did instil a general increase in time awareness among the urban populace. Although ownership of fashionable *horloges* gradually filtered down from the higher to the middle classes in the late eighteenth century, social differences could not easily be neutralised. On the eve of the French Revolution clocks and watches were common only in the probate inventories of the upper class, while lower-class people rarely owned a personal timepiece.⁴¹

Our Amsterdam dataset shows markedly different trends (fig. 4). Although in the first half of the eighteenth century, objects related to time management were exclusively found in large numbers among the wealthiest households, by 1780 timepieces had become commonplace among all three classes, with each recording them in at least three quarters of inventories. Still, the time lag between the development of numerical skills and the diffusion of clock and watch consumption suggests that, unlike in the realm of literacy, probate inventories are poor measurements of cognitive abilities. As far as numeracy is concerned, the perception of a steep improvement in fig. 1 clearly needs to be modified. The lack of objects relating to measuring and counting is not coterminous with a lack of numerical skills, which were already widespread among the Dutch population at the beginning of

39 De Moor and van Zanden, “Every woman counts”. See also A’Hearn, Baten, and Crayen, ‘Quantifying quantitative literacy’, 799-805.

40 Verhoeven, “Le pays”, 230-233.

41 Blondé and Verhoeven, ‘Against the clock’. For further studies on time awareness, see Glennie and Thrift, ‘The spaces of clock times’; Glennie and Thrift, ‘Reworking E. P. Thompson’s’; Glennie and Thrift, *Shaping the Day*.

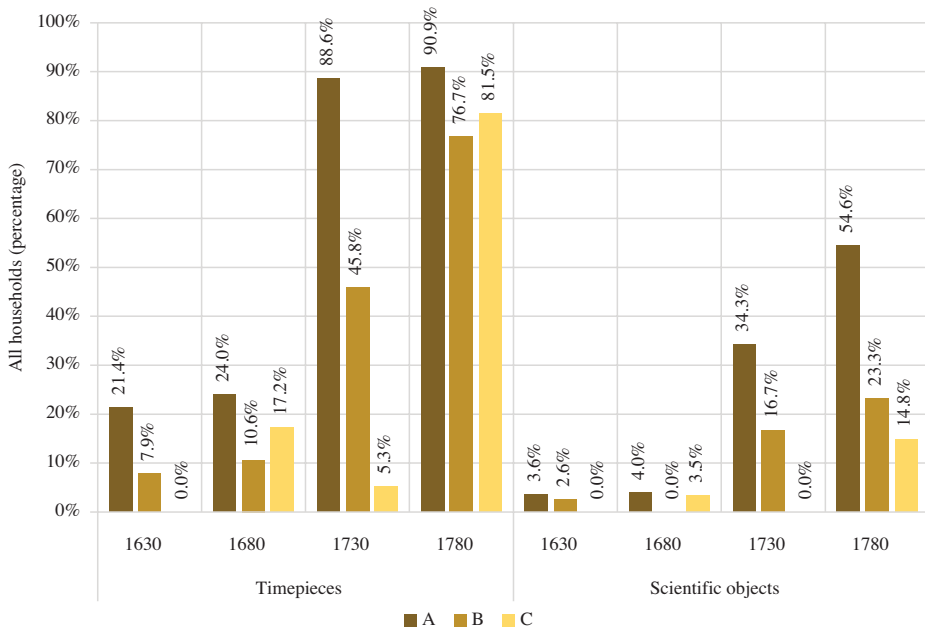


Fig. 4 Percentage of households owning at least one timepiece (left) and scientific object (right), by class.

the early modern era. Much of the rising prevalence of numeracy objects is to be attributed to the movement of clocks into the domestic environment, because the possession of balances and weights remained fairly stable in the seventeenth and eighteenth centuries.

Timepieces were probably more indicative of the material prosperity and conspicuous consumption of Amsterdam households than anything else.⁴² Unlike clocks, which were on average valued for more than thirty guilders throughout the eighteenth century, the price of pocket watches fell dramatically in this period, as has been shown by research on reported thefts in London, and is confirmed in our database. The average estimated value of a silver pocket watch almost halved in the fifty years spanning the third and fourth sample years, from fl. 25.7 in 1730 to fl. 14.5 in 1780 – a trend that is very close to Adam Smith’s observation in 1776 of watch prices falling continuously from the mid-seventeenth century onward, after Christiaan Huygens invented the pendulum clock and built the first balance spring. Technological innovation in Holland and Britain made timepieces increasingly affordable to a large share of Amsterdam’s population, whose affluence produced the necessary mass demand that was lacking in Antwerp.⁴³ This lack of prosperity led to the decline of the middle classes in Antwerp and a divestment from schooling, which had disastrous effects on literacy rates – though not, as mentioned, on age heaping frequencies.⁴⁴ Amsterdam households were more literate and better educated, but it is

⁴² See also De Vries, ‘Luxury’.

⁴³ Kelly and Ó Gráda, ‘Adam Smith’.

⁴⁴ Verhoeven, “Le pays”, 230.

unlikely that the possession of a clock or watch did much to further improve quantitative reasoning.

Indeed, not all measuring objects in the Amsterdam database were distributed across the social spectrum. Fig. 4 also juxtaposes the frequency of timepieces with ownership patterns of recently introduced scientific objects, such as weather houses and glasses, thermometers, and barometers. These objects, though also requiring mathematical calculus, appear to have been more closely related to the scientific knowledge of the intellectual elites. Surprisingly, the cost of such scientific tools does not seem to have been the main driver behind their concentration in the hands of the upper classes. In stark contrast to timepieces, weather and atmospheric measuring tools were at most estimated to be worth only a handful of guilders, and in this valuation, they were more often than not grouped together with other items. In this they were similar to maps and other cartographic material, which never caught on with the lower middle classes and appear to have followed the fate of paintings, which slowly went out of fashion over the course of the eighteenth century, in spite of their cheapness. The gap between the affordability and exclusive nature of some types of knowledge consumption is further investigated in the last section, which examines the knowledge objects that remained limited to elite homes.

From Consumption back to Production?

Any such survey of domestic intellectual culture has to start with curiosities. Collecting curiosities and setting up cabinets and rooms to display them was a popular activity among the early modern wealthy elite, in particular monarchs, universities, and ‘amateur’ science enthusiasts. Various sources attest to a stunning diversity of objects: mummies, monstrosities, birds of paradise, bones of giants, kayaks, Chinese writings, ‘unicorn’ horns (in all probability the horns of narwhals), Native American feather headdresses, armadillos, Roman coins, insects, and countless other curiosities were displayed haphazardly in one room.⁴⁵ These cabinets of curiosity were not necessarily scientific. They were a place of imagination, in which those who could afford to do so showed off their wealth and constructed their own personal versions of the world. The opulence of these cabinets was random: no chronological order or scientific criterion underpinned their arrangement. As the number of objects grew and spilled off the shelves of furniture cabinets, a collection could take over entire rooms. But during the eighteenth century, the focus shifted. The rise of science as a defined discipline meant that collections merely representing the wealth and intelligence of the owner were no longer sufficient; they were increasingly required to make sense of the world he or she inhabited in a more objective way.⁴⁶

Some of these cabinets were opened to the general public for educational purposes. There was, for example, the well-known collection of Levinus Vincent (1658-1727) at the

⁴⁵ Jorink, *Het 'Boeck der Nature'*, 267.

⁴⁶ Aloï, ‘Cabinets of Curiosities’ See also: McGeary, ‘Handel as Art Collector’; Cannady, ‘Thought Patterns’; Clark, ‘The Development’; Galambosova, ‘What Is a Wunderkammer?’; Chaliakopoulos, ‘The Pre-Modern Museum’.



Fig. 5 Andries van Buysen, after Romeyn de Hooghe, *Frontispiece to Wondertoneel der Natuur*, etching on paper, 22 cm x 31.5 cm, c. 1706, Amsterdam, Rijksmuseum.

Nieuwezijds Voorburgwal (until its relocation to Haarlem), who described his cabinet in catalogues like *Het Wondertoneel der Nature* (1706) and *Tweede deel of vervolg van het Wondertoneel der Nature* (1715). Vincent owned one of the most extensive collections of curiosities in the Republic. Fig. 5 shows Andries van Buysen's copy of the frontispiece made by Romeyn de Hooghe for Vincent's first catalogue. The cabinet is represented as a large room, in which many objects are displayed in cases attached to the high walls. Vincent's collection covered several rooms, though it is unlikely that the occupied space was actually as large and contained high vaulted ceilings as in the print. Many visitors can be seen taking a close look at several curiosities that are displayed on two long tables. The display contains animals and deformed humans preserved in *aqua fortis*, corals, minerals, fossils, and stuffed animals. The lower parts of the wall are lined with bookcases, and the image even shows two visitors in Arab dress. We have no independent confirmation of Arab or Persian guests, but among Vincent's known visitors were King Charles III of Spain, Tsar Peter the Great of Russia, and King Frederick of Prussia. It was the first natural history cabinet to be visited not only by the elite, but also by interested craftsmen, women, and children during fixed opening days. Vincent received around 3,500 guests between 1705 and 1737 in Haarlem, as recorded in his guest book – an average of two visitors per week.⁴⁷

47 Wijnman, 'Vincent Levinus', 1104.

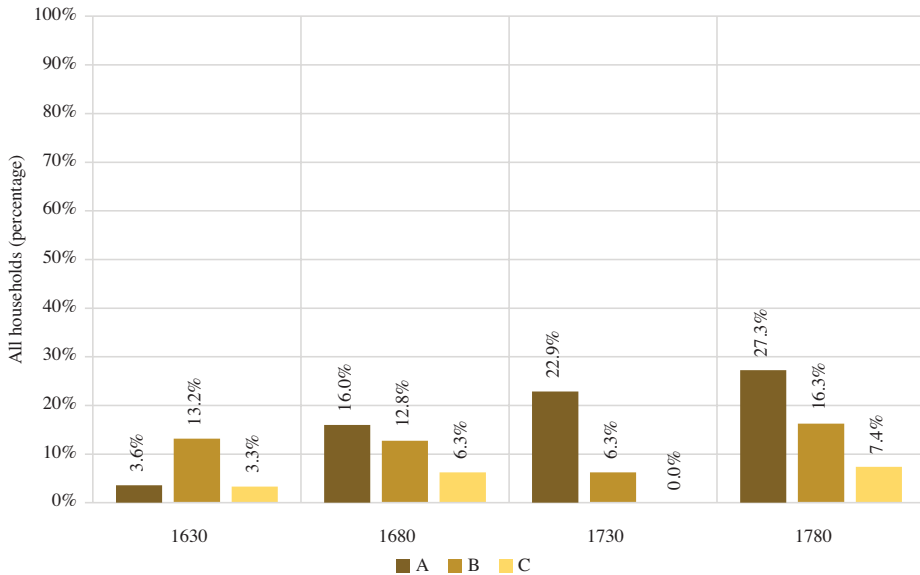


Fig. 6 Percentage of households owning at least one curiosity, by class.

The popularity of establishing cabinets of curiosities amongst rich and intellectually curious individuals, which has been demonstrated in previous research, is not reflected in our samples.⁴⁸ Not a single mention of such a cabinet was found in the dataset, which implies that it was a rare occurrence. However, some disparate curiosities have been recorded in the probate inventories, mostly in elite and upper middle-class households (fig. 6): medals, *agnus dei*, skulls, and exotic objects like pyramids, phaetons, corals, gemstones, and parrots (mostly as pets). Another interesting find are the Masonic glasses recorded in the 1780 inventory of carpenter Pieter Rowoudt. In themselves, they can perhaps not be classified as *curiosa*, but the origin story of Freemasonry was mired in a similar fascination with the occult. The Masonic lodges showed that people of different social classes, with different religious beliefs, and from different countries, could live together, respect, and help each other. Freemasonry was increasingly advocated during the second half of the eighteenth century, which was reflected in the decoration of utensils such as tobacco boxes, watches, and especially drinking glasses.⁴⁹

Ownership of scientific objects was recorded somewhat more commonly, especially in the second part of the eighteenth century (fig. 4). Even in 1780, however, it was only in class A that a majority of inventoried households owned at least one scientific instrument. Moreover, most of these pertained to measuring the weather and thus did not necessarily

⁴⁸ See, among others: Jorink, *Het 'Boeck der Nature'*; Impey and MacGregor (eds.), *The origins of museums*; Pomian, *Collectionneurs, amateurs et curieux*; Kenseth (ed.), *The age of the marvelous*; Bergvelt, Meijers, and Rijnders (eds.), *Verzamelen*; Grote (ed.), *Macrocosmos in Microcosmos*. Unlike the cabinet of Levinus Vincent, these studies discuss for the most part earlier collections from the seventeenth century.

⁴⁹ See for example Wallace-Murphy, *The Enigma of the Freemasons*.

indicate any active engagement with scientific experimentation. Still, Bloemsaat appears to not have been the only amateur scientist in our dataset. No less than 4 of the 205 eighteenth-century inventories recorded the presence of a microscope, each of which – like weather measuring tools – was estimated to be worth only a few guilders. Bloemsaat was not even the sole owner of an electrostatic generator, an instrument popular among students of the emerging science of electricity. Johan George Reisig, a bachelor who lodged at a house in the Nieuwendijk and died in February 1780 at age 53, owned one as well. Reisig's inventory records a sum of 779 guilders and his movable possessions; the total estimated value of 1,080 guilders classifies his estate as a class B inventory. For an upper middle-class burgher like Reisig, 10.5 guilders, the sum at which his microscope, electrostatic generator, and writing cabinet were valued, must have been only a modest sum.⁵⁰ Some of Bloemsaat's scientific objects were even more affordable, such as his aforementioned broken magic lantern (fl. 2), but also a camera obscura (fl. 1), sundial (fl. 2), and 'some mathematical instruments' (fl. 4).

The inventories of these two amateur scientists, then, suggest that the economic barriers to scientific experimentation were relatively low at the end of the eighteenth century. Even the libraries of Bloemsaat and Reisig were valued at moderate sums, at fl. 156 and fl. 180, respectively. The fact that a Catholic candlemaker and an upper middle-class bachelor had the means to engage in consuming and perhaps even reproducing new knowledge underscores the conclusion that the ability to pursue intellectual interests was available to a small but growing share of the population. Even in the early years of the Dutch Republic, successful artisans could become natural philosophers, as the case of Beeckman illustrates, but it was only in the course of the seventeenth and especially the eighteenth century that objects related to higher learning – a sizable collection of books, writing equipment, curiosities, and scientific devices – were found more regularly in the affluent households of large cities like Amsterdam.

A closer look at the socioeconomic circumstances surrounding the inventory-taking of Bloemsaat and Reisig suggests that participation in this 'Enlightened' consumerism could lead to financial trouble. Their possessions were each among the fifty-two inventories in the dataset (12.9 percent) that were requested by a judicial officer, a practice in which a legal heir could appeal to the States of Holland to draw up an inventory before accepting the inheritance, usually on the assumption that the deceased was indebted. While debts were not listed in either case, the fact that Bloemsaat's children were sent to an orphanage rather than being raised by their stepmother is indicative of the household's financial predicament. A preoccupation with science came at the expense of his candle manufacturing business, it seems, rather than leading to an accumulation of human capital yielding economic returns.

On the aggregate level, it was these types of Enlightened consumers operating in the space of the Republic of Letters who closed the feedback loop between practical and theoretical knowledge. At the same time, we should not overestimate the role of human capital. The expanding material culture of knowledge did little to stave off the stagnation

⁵⁰ SA, Notarissen 14350, Inventory of Johan George Reisig, 1 June 1780, fols. 147-152. Reisig's age at death can be found in SA, Stadssecretaris 162, Marriage and burial tax records, 15 February 1780.

and eventual decline of the Dutch economy in the course of the eighteenth century. On the individual level, in fact, for most affluent citizens consuming new knowledge was just that: consumption, not production. Beyond the funds to cover the cost of the knowledge objects discussed in this article, they above all needed sufficient time to spend – or waste – on learnedness. If common people substituted longer hours of work for leisure in the early modern era, as De Vries's industrious revolution hypothesis holds, then having the time and energy to engage with novel ideas about science and politics, in spite of this overall trend, perhaps became the predominant barrier distinguishing Adam Smith's 'men of speculation' from the labouring population. Even more than economic restraints, then, conspicuous consumption and social habitus informed the formation of an intellectual elite interested in reading, writing, and accumulating curiosities and scientific instruments.

Conclusion

The Dutch Republic was one of the most urbanised, literate, and best educated societies in Europe. As such, a democratisation of knowledge was not out of place. Even beyond the knowledge objects examined in this article, the consumer revolution created new locations for knowledge consumption: men and women ate meals in salons, drank coffee and tea in cafes, and demonstrated their awareness of and participation in new fashions in the streets. This gave rise to a robust and conversational audience, through which knowledge could be transferred from the intellectual elite to the general public.⁵¹ News, rumours, and propaganda from abroad spread around towns and cities, inspiring discussions in marketplaces, taverns, and even brothels.⁵² A majority of the Dutch urban population might therefore encounter the developing intellectual culture in the public sphere.

However, our analysis of the domestic consumption of knowledge in Amsterdam has laid bare a noticeable differentiation between two distinct cultures of cognition. The democratisation waves in book ownership, habitual writing, and timepiece consumption revealed by our database correspond closely to the unprecedented levels of human capital in the Dutch Republic as recorded in research on signature proficiency and age heaping. Skill formation in the workplace went hand in hand with the domestic use of practical knowledge objects for which elementary levels of counting, measuring, reading, and writing were required. On the other hand, the concentration of *curiosa*, scientific instruments, and large collections of secular book titles in the hands of the upper (middle) classes indicates that developing more advanced interests in theoretical knowledge remained the purview of a limited, if growing group of affluent burghers.

Importantly, however, a significant proportion of these educated and prosperous citizens hailed from the industrious middle classes, which were educated in basic practical skills and often continued to develop them further in their occupations. Moreover, the relatively low values of sizeable libraries and scientific and other measuring instruments

⁵¹ Kwass, *The Consumer Revolution*, 156; Dijksterhuis and Weber, 'The Netherlands as a Laboratory', 8.

⁵² De Winter, 'Kennis over verre zeeën', 103.

recorded in the inventories reveal that economic constraints on bridging practical and theoretical knowledge were fairly limited. The ‘union of hand and mind’ that characterised the Dutch Scientific Revolution and Enlightenment must ultimately be attributed to the fact that an above-average income and enough leisure time enabled people to move from passively consuming to actively (re)producing knowledge.

This study of Amsterdam’s material culture of knowledge, then, dovetails with recent scholarship on human capital formation. Historians disagree to what extent markers like signature literacy and book ownership are related to economic development.⁵³ Some argue that we instead need variables for upper-tail human capital of the sort that we find in our database in the form of secular book collections, writing equipment, and scientific instruments.⁵⁴ That may be so, and we hope to inspire studies that will quantify these variables intelligibly, but our material culture lens has also shown that a blind focus on their potential for production, technological development, and economic growth obscures the fact that objects like clocks, libraries, curiosities, and scientific instruments also – and perhaps predominantly so – fulfilled a desire for conspicuous consumption.

From this perspective, a contemporary like Diderot perhaps provides a better window onto the consumer behaviour epitomised by Bloemsaat than does Beeckman, who shared the same occupation as our amateur scientist, but died almost a century and a half earlier. In a 1769 essay, the editor of the *Encyclopédie* famously described how he became ‘a slave to the novel’ when the acquisition of a new dressing gown snowballed into an overhaul of his domestic interior and an accumulation of consumer debts.⁵⁵ The material culture of knowledge was not immune to the so-called Diderot effect; that is, the spiral of consumption that follows from the additional demand created by the acquisition of a related object. From publishing to the clock industry, the mass demand initiated by elite consumers might have been their most tangible contribution to technological advancement.

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53 Compare Baten and Van Zanden, ‘Book production’, and Buringh and Van Zanden, ‘Chartering’, with Ogilvie, Edwards, and Küpker, ‘Economically relevant human capital’.

54 Mokyr, *The Gifts*; Mokyr, *A Culture*; Ogilvie, Edwards, and Küpker, ‘Economically relevant human capital’.

55 Diderot, ‘Regrets’.

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